PATENT
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Attorney Docket No. 5725.0570-01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	
Nathalie MOUGIN	)	Group Art Unit: 1615
	)	
Application No. 10/656,238	)	Examiner: Unassigned
	)	
Filing Date: September 8, 2003	)	Confirmation No. 1859
	)	
For: COSMETIC COMPOSITION COMPRISING POLYMERS HAVING A STAR STRUCTURE, THE POLYMERS, AND THEIR USE	)	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

REQUEST FOR CORRECTED PATENT APPLICATION PUBLICATION UNDER 37 C.F.R. § 1.221(b)

The U.S. Patent and Trademark Office published the above-identified Application No. 10/656,238 as Publication No. US-2005-0031574-A1, on February 10, 2005. The published application contains mistakes that are the fault of the Office and may be material. Attached hereto are a copy of both the relevant page of the originally filed application and marked-up copy of the corresponding page of the published application containing the mistakes.

A mistake is material when it affects the public's ability to appreciate the technical disclosure of the patent application publication or determine the scope of

the provisional rights that an applicant may seek to enforce upon issuance of a patent. See C.F.R. § 1.221(b).

(A) On page 3, para. [0047] line, 1, "(R^1)" should read --(R^6)--.

(B) On page 4, para. [0100], line 2, "COCI" should read --COCl--.

(C) On page 5, para. [0123], line 2, after "unsaturated" insert –ring;--

For at least the foregoing reasons, Applicant requests that the Office correct the above-identified material mistakes in the published application, which was the fault of the Office. Further, Applicant requests that the Office forward a copy of the corrected published application or at least a notification of the occurrence or predicted occurrence of the corrected publication once it has been corrected.

Applicant believes that no Petition or fee is due in connection with this Request. However, if any Petition or fee is due, please grant the Petition and charge the fee to Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: April 11, 2005

By: _____
Adriana L. Burgy
Reg. No. 48,564

Enclosures:
- Marked-up copy of the pages of the published application; and
- Corresponding pages of the originally filed application.

"R'" should read → --R^b--.

[0047] R^1 and R^7 represent, independently of one another, H or a linear or branched alkyl radical having 1-20 carbon atoms; it being given that R^6 and R^7 can be joined to form an alkylene group having 2-7, preferably 2-5, carbon atoms;

[0048] R^8 represents H, a linear or branched alkyl radical having 1-20 carbon atoms or an aryl radical;

[0049] a —COOR radical, in which R is a linear or branched alkyl radical having 1 to 20, preferably 1-6, carbon atoms which is optionally substituted by one or more halogens;

[0050] a —CONHR' radical, in which R' is hydrogen or a saturated or unsaturated, linear or branched, hydrocarbonaceous radical having 1 to 20, preferably 1-6, carbon atoms which is optionally substituted by one or more halogens, nitrogens and/or oxygens;

[0051] an —OCOR" radical, in which R" is hydrogen or a saturated or unsaturated, linear or branched, hydrocarbonaceous radical having 1 to 20 carbon atoms which is optionally substituted by one or more halogens, nitrogens and/or oxygens;

[0052] a radical comprising at least one silicon atom and in particular radicals such as: an —R-siloxane radical, a —CONHR-siloxane radical, a —COOR-siloxane radical or an —OCO—R-siloxane radical, in which radicals R is a linear or branched alkyl, alkylthio, alkoxy, aryloxy or heterocycloxy radical having 1-20 carbon atoms.

[0053] The term "siloxane" is understood to mean a compound comprising $(—SiR^aR^bO—)_n$ units, in which units R^a and R^b can represent, independently of one another, a hydrogen; a halogen; a saturated or unsaturated, linear or branched, hydrocarbonaceous radical having 1 to 36 carbon atoms which is optionally substituted by one or more halogens, nitrogens and/or oxygens; or a cyclic hydrocarbonaceous radical having 1 to 20 carbon atoms; n being greater than or equal to 1.

[0054] For the purpose of this invention, the term "independent," when used to describe the relationship of radicals, atoms, substituents, functional groups, etc., means that each of the radicals, atoms, substituents, functional groups, etc. may be the same or different from the other, or some radicals, atoms, substituents, functional groups, etc., may be the same while the others may be different.

[0055] Mention may in particular be made of polydimethylsiloxanes (PDMSs) comprising 1 to 200, preferably less than 100, repeat units.

[0056] Furthermore, R^1 and R^3 can be connected to one another so as to form a ring of formula $(CH_2)_n$ which can be substituted by one or more halogens and/or oxygens and/or nitrogens and/or by alkyl radicals having 1 to 6 carbon atoms.

[0057] The term "aryl" or "heterocyclyl" is understood to mean the definition commonly understood by a person skilled in the art and which may be illustrated by the prior art WO97/18247.

[0058] Preferably, the monomers M can be chosen from:

[0059] acrylic or methacrylic esters obtained from linear, branched or cyclic aliphatic alcohols and/or from aromatic alcohols, preferably C_1-C_{20} alcohols, such as methyl (meth)acrylate, ethyl (meth)acrylate, propyl (meth)acrylate, butyl (meth)acrylate, isobutyl (meth)acrylate or tert-butyl (meth)acrylate;

[0060] C_1-C_4 hydroxyalkyl (meth)acrylates, such as 2-hydroxyethyl (meth)acrylate or 2-hydroxypropyl (meth)acrylate;

[0061] ethylene glycol, diethylene glycol or polyethylene glycol (meth)acrylates with a hydroxyl or ether end;

[0062] vinyl, allyl or methallyl esters obtained from linear or branched C_1-C_{10} or cyclic C_1-C_6 aliphatic alcohols and/or from aromatic alcohols, preferably C_1-C_6 alcohols, such as vinyl acetate, vinyl propionate, vinyl benzoate or vinyl tert-butylbenzoate;

[0063] N-vinylpyrrolidone; vinylcaprolactam; vinyl-N-alkylpyrroles having 1 to 6 carbon atoms; vinyloxazoles; vinylthiazoles; vinylpyrimidines; vinylimidazoles; and vinyl ketones;

[0064] (meth)acrylamides obtained from linear, branched or cyclic aliphatic amines and/or from aromatic amines, preferably C_1-C_{20} amines, such as tert-butylacrylamide; and (meth)acrylamides, such as acrylamide, methacrylamide or di(C_1-C_4)alkyl(meth)acrylamides;

[0065] olefins, such as ethylene, propylene, styrene or substituted styrene;

[0066] fluorinated or perfluorinated acrylic or vinyl monomers, in particular (meth)acrylic esters with perfluoroalkyl units;

[0067] monomers comprising an amine functional group in the free or else partially or completely neutralized or else partially or completely quaternized form, such as dimethylaminoethyl (meth)acrylate, dimethylaminoethylmethacrylamide, vinylamine, vinylpyridine or diallyldimethylammonium chloride;

[0068] carboxybetaines or sulphobetaines obtained by partial or complete quaternization of monomers comprising ethylenic unsaturation comprising an amine functional group by sodium salts of carboxylic acids comprising a mobile halide (sodium chloroacetate, for example) or by cyclic sulphones (propane sulphone);

[0069] silicone-comprising (meth)acrylates or (meth)acrylamides, in particular (meth)acrylic esters comprising siloxane units;

[0070] -their mixtures.

[0071] The particularly preferred monomers are chosen from:

[0072] (meth)acrylic esters obtained from linear or branched aliphatic alcohols, preferably C_1-C_{20} alcohols;

[0073] C_1-C_{20} (meth)acrylic esters comprising perfluoroalkyl units;

[0074] C_1-C_{20} (meth)acrylic esters comprising siloxane units;

[0075] (meth)acrylamides obtained from linear, branched or cyclic aliphatic amines and/or from aromatic amines, preferably C_1-C_{20} amines, such as tert-butylacrylamide; or (meth)acrylamides, such as acrylamide, methacrylamide or di(C_1-C_4)alkyl(meth)acrylamides;

[0076] vinyl, allyl or methallyl esters obtained from linear or branched C_1-C_{10} or cyclic C_1-C_6 aliphatic alcohols;

[0077] vinylcaprolactam;

[0078] optionally substituted styrene;

[0079] their mixtures.

[0080] In the context of the present invention, the initiator can be any compound, in particular a molecular or polymeric compound, having at least two atoms and/or groups which are radically transferable by polymerization.

[0081] The initiator can in particular be an oligomer or a polymer capable of being obtained by radical polymerization, by polycondensation, by anionic or cationic polymerization or by ring opening.

[0082] The transferable atoms and/or groups can be situated at the ends of the polymer chain or along the backbone.

[0083] Mention may in particular be made of the compounds corresponding to one of the following formulae:

[0084] $R^{11}CO—X$

[0085] $R^{11}_xR^{12}_yR^{13}_zC—(RX)_t$, in which x, y and z represent an integer ranging from 0 to 4, t an integer ranging from 1 to 4, and x+y+z=4-t;

[0086] $R^{13}_xC_6—(RX)_y$ (saturated ring with 6 carbons), in which x represents an integer ranging from 7 to 11, y represents an integer ranging from 1 to 5, and x+y=12;

[0087] $R^{13}_xC_6—(RX)_y$ (unsaturated ring with 6 carbons), in which x represents an integer ranging from 0 to 5, y represents an integer ranging from 1 to 6, and x+y=6;

[0088] $[—(R^{11})(R^{12})(R^{13})C—(RX)—]_n$, in which n is greater than or equal to 1; cyclic or linear;

[0089] $[—(R^{12})_xC_6(RX)_y—R^{11}—]_n$, in which x represents an integer ranging from 0 to 6, y represents an integer ranging from 1 to 6 and n is greater than or equal to 1, with x+y=4 or 6; cyclic or linear;

[0090] $[—(R^{12})_xC_6(RX)_y—R^{11}—]_n$, in which x represents an integer ranging from 0 to 12, y represents an integer ranging from 1 to 12 and n is greater than or equal to 1, with x+y=10 or 12; cyclic or linear;

[0091] $R^{11}R^{12}R^{13}Si—X$

[0092] $—[OSi(R^{11})_x(RX)_y]_n$, cyclic or linear, in which x and y represent an integer ranging from 0 to 2 and n is greater than or equal to 1, with x+y 2;

[0093] $R^{11}R^{12}N—X$

[0094] $R^{11}N—X_2$

[0095] $(R^{11})_xP(O)_y—X_{3-x}$, in which x and y represent integers ranging from 0 to 2 and x+y=5;

[0096] $(R^{11}O)_xP(O)_y—X_{3-x}$, in which x and y represent integers ranging from 0 to 2 and x+y=5;

[0097] $—[(R^{11})_tN_zP(O)_x(O—RX)_y—]_n$, cyclic or linear, in which x represents an integer ranging from 0 to 4, y represents an integer ranging from 1 to 5, z represents an integer ranging from 0 to 2, t represents an integer ranging from 0 to 3 and n is greater than or equal to 1;

[0098] in which:

[0099] R, R^{11}, R^{12} and R^{13} represent, independently of one another, a hydrogen or halogen atom; a linear or branched alkyl radical having 1-20, preferably 1-10 and more preferably 1-6 carbon atoms; a cycloalkyl radical having 3-8 carbon atoms; a $—C(=Y)R^5$, $—C(=Y)NR^6R^7$ or $—R^8_3Si$ radical (see the definitions of R^5 to R^8 above);

[0100] COCl; —OH; —CN; an alkenyl or alkynyl radical having 2-20, preferably 2-6, carbon atoms; an oxiranyl or glycidyl radical or an alkylene or alkenylene radical substituted with an oxiranyl or a glycidyl; an aryl, heterocyclyl, aralkyl or aralkenyl radical; or an alkyl radical having 1-6 carbon atoms in which all or part of the hydrogen atoms are substituted either by halogen atoms, such as fluorine, chlorine or bromine, or by an alkoxy group having 14 carbon atoms or by an aryl, heterocyclyl, $—C(=Y)R^5$, $—C(=Y)NR^6R^7$, oxiranyl or glycidyl radical;

"COCl" should read —COCl—

[0101] X represents a halogen atom, such as Cl, Br or I, or an —OR', —SR, —SeR, —OC(=O)R', —OP(=O)R', —OP(=O)(OR')$_2$, —OP(=O)OR', —O—NR'$_{12}$, —S—C(=S)NR'$_2$, —CN, —NC, —SCN, —CNS, —OCN, —CNO and —N_3 radical, in which R' represents an alkyl radical having 1-20 carbon atoms which is optionally substituted by one or more halogen atoms, in particular fluorine and/or chlorine atoms, and R represents a linear or branched alkyl or aryl radical having 1-20, preferably 1-10, carbon atoms, it additionally being possible for the —NR'$_2$ group to represent a cyclic group, the two R' groups being joined so as to form a 5-, 6- or 7-membered heterocycle.

[0102] Preferably, X represents a halogen atom and in particular a chlorine or bromine atom.

[0103] The initiator is preferably chosen from the compounds of formula $—R^{13}_xC_6—(RX)_y$ (saturated ring with 6 carbons) in which x represents an integer ranging from 7 to 11, y represents an integer ranging from 1 to 5 and x+y=12;

[0104] $—[—(R^{12})_xC_6(RX)_y—R^{11}—]_n$, in which x represent an integer ranging from 0 to 6, y represents an integer ranging from 1 to 6 and n is greater than or equal to 1, with x+y=4 or 6; cyclic or linear; and

[0105] $—[OSi(R^{11})_x(RX_y]_n$, cyclic or linear, in which x and y represent an integer ranging from 0 to 2 and n is greater than or equal to 1, with x+y=2.

[0106] Mention may in particular be made, as initiator, of the following compounds:

[0107] octa(2-isobutyrylbromide)octa(tert-butyl)calix(8)arene,

[0108] octa(2-propionylbromide)octa(tert-butyl)calix(8)arene, and

[0109] hexakis(α-bromomethyl)benzene.

[0110] The compound comprising a transition metal which is capable of participating in a reduction stage with the initiator and a "dormant" polymer chain can be chosen from those which correspond to the formula $M^{n+}X'_n$, in which formula:

[0111] M can be chosen from Cu, Au, Ag, Hg, Ni, Pd, Pt, Rh, Co, Ir, Fe, Ru, Os, Re, Mn, Cr, Mo, W, V, Nb, Ta and Zn,

[0112] X' can represent a halogen (in particular bromine or chlorine), OH, $(O)_{1/2}$, an alkoxy radical having 1-6 carbon atoms, $(SO_4)_{1/2}$, $(PO_4)_{1/3}$, $(HPO_4)_{1/2}$, (H_2PO_4), a triflate, hexafluorophosphate, methanesulphonate, arylsulphonate, SeR, CN, NC, SCN, CNS, OCN, CNO, N_3 and $R'CO_2$ radical, in which R represents a linear or branched alkyl or aryl radical having 1-20, preferably 1-10, carbon atoms and R' represents H or a linear or branched alkyl radical having 1-6 carbon atoms or an aryl radical which is optionally substituted by one or more halogen atoms, in particular fluorine and/or chlorine atoms;

[0113] n is the charge on the metal.

[0114] The choice is preferably made of M representing copper or ruthenium and X' representing bromine or chlorine.

[0115] Mention may in particular be made of copper bromide.

[0116] Mention may be made, among the ligands capable of being used in the context of the present invention, of compounds comprising at least one nitrogen, oxygen, phosphorus and/or sulphur atom which are capable of coordinating via a a bond to the compound comprising a transition metal.

[0117] Mention may also be made of compounds comprising at least two carbon atoms which are capable of coordinating via a T bond to the compound comprising a transition metal.

[0118] Mention may further be made of compounds comprising at least one carbon atom which are capable of coordinating via a σ bond to the compound comprising a transition metal but which do not form a carbon-carbon bond with the monomer during the polymerization, that is to say which do not participate in β-addition reactions with the monomers.

[0119] Mention may further be made of compounds capable of coordinating via μ or η bond to the compound comprising a transition metal.

[0120] Mention may in particular be made of the compounds of formula:

$$R^9\text{-}Z\text{—}(R^{14}\text{-}Z)_m\text{—}R^{10}$$

[0121] in which:

[0122] —R^9 and R^{10} are, independently of one another, a hydrogen atom; a linear or branched alkyl radical having 1-20, preferably 1-10, carbon atoms; an aryl radical; a heterocyclyl radical; or an alkyl radical having 1-6 carbon atoms which is substituted with an alkoxy radical having 1-6 carbon atoms or a dialkylamino radical having 1-4 carbon atoms or a —C(=Y)R^5 or —C(=Y)NR^6R^7 and/or YC(=Y)R^8 radical (see the definitions R^5 to R^8 and Y above);

[0123] it being given that R^9 and R^{10} can be joined so as to form a saturated or unsaturated

[0124] R^{14} represents, independently of one another, a divalent group chosen from alkanediyls having 24 carbon atoms; alkenylenes having 24 carbon atoms; cycloalkanediyls having 3-8 carbon atoms; cycloalkenediyls having 3-8 carbon atoms; arenediyls and heterocyclylenes;

[0125] Z represents O, S, NR^{15} or PR^{15}, with R^{15} representing H; a linear or branched alkyl radical having 1-20 carbon atoms; an aryl radical; a heterocyclyl radical; or an alkyl radical having 1-6 carbon atoms which is substituted with an alkoxy radical having 1-6 carbon atoms or a dialkylamino radical having 14 carbon atoms or a —C(=Y)R^5 or —C(=Y)NR^6R^7 and/or YC(=Y)R^8 radical (see the definitions of R^5 to R^8 and Y above);

[0126] m is between 0 and 6.

[0127] Mention may also be made of the compounds of formula: $R^{20}R^{21}C[C(=Y)R^5]$ in which:

[0128] R^{20} and R^{21} are, independently of one another, a hydrogen atom; a halogen atom; a linear or branched alkyl radical having 1-20, preferably 1-10, carbon atoms; an aryl radical; or a heterocyclyl radical; it being given that R^{20} and R^{21} can be joined so as to form a saturated or unsaturated ring; it being given that, in addition, each radical can be substituted with an alkyl radical having 1-6 carbon atoms, an alkoxy radical having 1-6 carbon atoms or an aryl radical;

[0129] R^5 and Y being defined above.

[0130] Mention may further be made, as ligands, of carbon monoxide; optionally substituted porphyrins and porphycenes; optionally substituted ethylenediamine and propylenediamine; polyamines with tertiary amines, such as pentamethyldiethylenetriamine; aminoalcohols, such as aminoethanol and aminopropanol, which are optionally substituted; glycols, such as ethylene glycol or propylene glycol, which are optionally substituted; arenes, such as benzene, which are optionally substituted; optionally substituted cyclopentadiene; optionally substituted pyridines and bipyridines; acetonitrile; 1,10-phenanthroline; cryptands and crown ethers; or sparteine.

[0131] The preferred ligands are chosen in particular from pyridines and bipyridines which are optionally substituted by C_2-C_{15} alkyl radicals, in particular C_6-C_{12} radicals and especially the nonyl radical; or polyamines with tertiary amines, such as pentamethyldiethylenetriamine.

EXAMPLE 2

Preparation of an 8-Branched Star Polymer, Each Branch of Which was a Block Copolymer

[0183] 1) First Stage: Preparation of a Star Polymer with 8 poly(tert-butyl acrylate) Branches

[0184] The reactants used were as follows:

monomer 1: tert-butyl acrylate (Tg = 50° C.)	115 g
monomer 2: butyl acrylate (Tg = −50° C.)	5 g
initiator (prepared according to Example 1) (corresponding to 4×10^{-3} mol of RBr)	1.19 g
CuBr (corresponding to 4×10^{-3} mol)	0.57 g
Bipyridine (corresponding to 8×10^{-3} mol)	1.25 g

[0185] The monomers were distilled beforehand.

[0186] The reactants, except the monomers, were mixed in a sealed and flame-treated reactor comprising a nitrogen inlet and then the monomer 1 was added.

[0187] The reactor was heated under nitrogen to approximately 120° C. and reaction was then allowed to take place at 120° C. for 4 hours, the nitrogen inlet being disconnected.

[0188] 2) Second Stage: Formation of the Second Block at the End of Each Branch

[0189] The monomer 2 was then added and reaction was again allowed to take place at 120° C. for 4 hours.

[0190] After reaction, the reaction mixture was allowed to cool; a viscous green solution was obtained, which solution was dissolved in dichloromethane. The polymer solution was passed through neutral alumina and the clear solution obtained was precipitated from a methanol/water (80/20) mixture in a polymer/precipitant ratio of 1/5.

[0191] 115 g of polymer were obtained, i.e., a yield of 96%, which polymer existed in the form of a viscous product.

[0192] This polymer was a star polymer with 8 poly(isobutyl acrylate) branches, each branch of which was a block copolymer: calix(poly(tert-butyl acrylate)-block-poly(butyl acrylate)).

[0193] Characterization was carried out by GC:THF linear polystyrene equivalent, light scattering detection: 350,000 g/mol (theoretical mass: approximately 240,000); polydispersity index: 1.6.

[0194] The polymer obtained exhibited values in accordance with those expected.

[0195] The polymer was soluble in ethanol.

Example 3

Styling Composition

[0196] A preconditioning styling composition was prepared which comprises:

polymer of Example 1	7 g
ethanol	q.s. for 100 g

[0197] An aerosol lacquer was subsequently prepared which comprises:

above composition	70 g
DME	30 g

[0198] After application of the lacquer to the hair, a good styling power was obtained, as well as a rapid drying time and good cosmetic properties, in particular with regard to disentangling and touch.

Insert -- WHAT IS CLAIMED IS --.

1-40. (Canceled)

41. A hair composition, comprising, in an acceptable medium, at least one polymer having a star structure chosen from structures of formula (I):

$$A\text{—}[(M1)_{p1}\text{-}(M2)_{p2} \ldots (Mi)_{pj}]_n \quad (I)$$

in which:

A is chosen from polyfunctional centers having a functionality n; $[(M1)_{p1}\text{-}(M2)_{p2} \ldots (Mi)_{pj}]$ represents a branch comprising at least one polymerized monomeric unit Mi having a polymerization index pj;

n is an integer greater than or equal to 2;

pj is greater than or equal to 2;

there are at least two branches, which may be identical or different; and

said at least two branches are grafted covalently to A;

wherein said at least one polymerized monomeric unit Mi comprised by at least one of said at least two branches is chosen from polymerized monomeric units Mk, which may be identical or different, wherein a homopolymer formed by the corresponding polymerized monomeric units Mk has a Tg of greater than or equal to 10° C.; and

wherein said at least one polymerized monomeric unit Mi contained by at least one of said at least two branches is chosen from polymerized monomeric units Mj, which may be identical or different, wherein a homopolymer formed by the corresponding polymerized monomeric units Mj has a Tg of less than or equal to 10° C.

42. A composition according to claim 41, wherein said at least one polymerized monomeric unit Mi chosen from polymerized monomeric units Mk is present in an amount ranging from 55 to 95 percent by weight relative to the total weight of the polymerized monomeric units Mi.

43. A composition according to claim 41, wherein said at least one polymerized monomeric unit Mi chosen from polymerized monomeric units Mj is present in an amount ranging from 5 to 45 percent by weight relative to the total weight of the polymerized monomeric units Mi.

44. A composition according to claim 44, wherein said at least one agent which is able to form a film.

45. A composition according to claim 44, wherein said at least one agent is chosen from plasticizing agents and coalescence agents.

- a radical chosen from CN, $C(=Y)R^5$, $C(=Y)NR^6R^7$, $YC(=Y)R^5$, cyclic $NC(=Y)R^5$, SOR^5, SO_2R^5, OSO_2R^5, $NR^8SO_2R^5$, PR^5_2, $P(=Y)R^5_2$, YPR^5_2, $YP(=Y)R^5_2$, NR^8_2, which can be quaternized with an additional R^8 group, aryl and heterocyclyl,

with: - Y represents O, S or NR^8 (preferably O),

- R^5 represents a linear or branched alkyl, alkylthio or alkoxy radical having 1-20 carbon atoms; an OH radical; an OM' radical with M' = alkali metal; an aryloxy radical or a heterocyclyloxy radical;

- R^6 and R^7 represent, independently of one another, H or a linear or branched alkyl radical having 1-20 carbon atoms; it being given that R^6 and R^7 can be joined to form an alkylene group having 2-7, preferably 2-5, carbon atoms;

- R^8 represents H, a linear or branched alkyl radical having 1-20 carbon atoms or an aryl radical;

- a -COOR radical, in which R is a linear or branched alkyl radical having 1 to 20, preferably 1-6, carbon atoms which is optionally substituted by one or more halogens;

- a -CONHR' radical, in which R' is hydrogen or a saturated or unsaturated, linear or branched, hydrocarbonaceous radical having 1 to 20, preferably 1-6, carbon atoms which is optionally substituted by one or more halogens, nitrogens and/or oxygens;

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- R, R^{11}, R^{12} and R^{13} represent, independently of one another, a hydrogen or halogen atom; a linear or branched alkyl radical having 1-20, preferably 1-10 and more preferably 1-6 carbon atoms; a cycloalkyl radical having 3-8 carbon atoms; a $-C(=Y)R^5$, $-C(=Y)NR^6R^7$ or $-R^8{}_3Si$ radical (see the definitions of R^5 to R^8 above); -COCl; -OH; -CN; an alkenyl or alkynyl radical having 2-20, preferably 2-6, carbon atoms; an oxiranyl or glycidyl radical or an alkylene or alkenylene radical substituted with an oxiranyl or a glycidyl; an aryl, heterocyclyl, aralkyl or aralkenyl radical; or an alkyl radical having 1-6 carbon atoms in which all or part of the hydrogen atoms are substituted either by halogen atoms, such as fluorine, chlorine or bromine, or by an alkoxy group having 1-4 carbon atoms or by an aryl, heterocyclyl, $-C(=Y)R^5$, $-C(=Y)NR^6R^7$, oxiranyl or glycidyl radical;

- X represents a halogen atom, such as Cl, Br or I, or an -OR', -SR, -SeR, $-OC(=O)R'$, $-OP(=O)R'$, $-OP(=O)(OR')_2$, $-OP(=O)OR'$, $-O-NR'_2$, $-S-C(=S)NR'_2$, -CN, -NC, -SCN, -CNS, -OCN, -CNO and $-N_3$ radical, in which R' represents an alkyl radical having 1-20 carbon atoms which is optionally substituted by one or more halogen atoms, in particular fluorine and/or chlorine atoms, and R represents a linear or branched alkyl or aryl radical having 1-20, preferably 1-10, carbon atoms, it additionally being possible for the $-NR'_2$ group to represent a cyclic group, the two R' groups being joined so as to form a 5-, 6- or 7-membered heterocycle.

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Mention may further be made of compounds comprising at least one carbon atom which are capable of coordinating via a σ bond to the compound comprising a transition metal but which do not form a carbon-carbon bond with the monomer during the polymerization, that is to say which do not participate in β-addition reactions with the monomers.

Mention may further be made of compounds capable of coordinating via μ or η bond to the compound comprising a transition metal.

Mention may in particular be made of the compounds of formula:

$$R^9\text{-}Z\text{-}(R^{14}\text{-}Z)_m\text{-}R^{10}$$

in which:

- R^9 and R^{10} are, independently of one another, a hydrogen atom; a linear or branched alkyl radical having 1-20, preferably 1-10, carbon atoms; an aryl radical; a heterocyclyl radical; or an alkyl radical having 1-6 carbon atoms which is substituted with an alkoxy radical having 1-6 carbon atoms or a dialkylamino radical having 1-4 carbon atoms or a $-C(=Y)R^5$ or $-C(=Y)NR^6R^7$ and/or $YC(=Y)R^8$ radical (see the definitions R^5 to R^8 and Y above);

it being given that R^9 and R^{10} can be joined so as to form a saturated or unsaturated ring;

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WHAT IS CLAIMED IS:

1. A polymer having a star structure chosen from structures of formula (I):

$$A\text{-}[(M1)_{p1}\text{-}(M2)_{p2}\text{. . .}(Mi)_{pj}]_n \quad (I)$$

in which:

A is chosen from polyfunctional centers having a functionality n;

$[(M1)_{p1}\text{-}(M2)_{p2}\text{. . .}(Mi)_{pj}]$ represents a branch comprising at least one polymerized monomeric unit Mi having a polymerization index pj;

n is an integer greater than or equal to 2;

i is greater than or equal to 2;

pj is greater than or equal to 2;

said at least two branches may be identical or different; and

said at least two branches are grafted covalently to A;

wherein said at least one polymerized monomeric unit Mi comprised by at least one of said at least two branches is chosen from polymerized monomeric units Mk, which may be identical or different, wherein a homopolymer formed by the corresponding polymerized monomeric units Mk has a Tg of greater than or equal to 10°C;

wherein said at least one polymerized monomeric unit Mi contained by at least one of said at least two branches is chosen from polymerized monomeric units Mj,

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